

## 104.5 - Spectrometry, Single Element Standard Solutions

These SRMs are intended as standard solutions for calibrating instruments used in atomic spectrometry, including atomic absorption spectrophotometry, inductively coupled plasma optical emission spectrometry, and inductively coupled plasma mass spectrometry. They can also be used in conjunction with any other analytical technique or procedure where standard solutions are required. Each SRM is a single element solution of 50 mL with a nominal concentration of 10 mg/g, except where indicated. Each unit is provided in either a single high density polyethylene bottle or in 5 x 10 mL borosilicate glass ampoules. NOTE: The certified values for SRM standard solution lots produced after March 1997 are stated in mass units, mg/g, rather than mg/mL. For the convenience of the user, each certificate provides instructions for preparing SRM dilutions by volume as well as by mass.

Commercial Producers of Elemental Standard Solutions: Instructions and a spreadsheet have been designed as an aid for establishing traceability of a batch of an elemental solution to the corresponding elemental spectrometric solution from the NIST SRM 3100 Series. Spreadsheet with ICP-OES example data is also included. When all required input fields are filled, the spreadsheet will calculate the traceable mass fraction and uncertainty of the batch elemental solution standard. The uncertainty provided by the spreadsheet assumes that the tested lot is stable. Any uncertainty due to changes over time to the lot tested, need to be quantified by the producer of the lot, and incorporated into the total uncertainty of the lot.

Instructions: [http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100\\_Version1-2\\_Instructions.pdf](http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100_Version1-2_Instructions.pdf)  
 Spreadsheet: [http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100\\_TraceabilityToolsVersion1-2.xls](http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100_TraceabilityToolsVersion1-2.xls)  
 Sample data: [http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100\\_ExamplesDataSetsforTraceabilityToolsVersion1-2.xls](http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100_ExamplesDataSetsforTraceabilityToolsVersion1-2.xls)

PLEASE NOTE: The tables are presented to facilitate comparisons among a family of materials to help customers select the best SRM for their needs. For specific values and uncertainties, the certificate is the only official source.

SRM	Description	Unit of Issue	Nominal Acid Concentration of Matrix
3101a	Aluminum (Al) Standard Solution	50 mL	HNO <sub>3</sub> 10%
3102a	Antimony (Sb) Standard Solution	50 mL	HNO <sub>3</sub> 10% + HF 2%
3103a	Arsenic (As) Standard Solution	50 mL	HNO <sub>3</sub> 10%
3104a	Barium (Ba) Standard Solution	50 mL	HNO <sub>3</sub> 10%
3105a	Beryllium (Be) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3106	Bismuth (Bi) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3107	Boron (B) Standard Solution	50 mL	H <sub>2</sub> O
3108	Cadmium (Cd) Standard Solution	50 mL	HNO <sub>3</sub> 10%
3109a	Calcium (Ca) Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3110	Cerium (Ce) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3111a	Cesium (Cs) Standard Solution	50 mL	HNO <sub>3</sub> 1%
3112a	Chromium (Cr) Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3113	Cobalt (Co) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3114	Copper (Cu) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3115a	Dysprosium (Dy) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3116a	Erbium (Er) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3117a	Europium (Eu) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3118a	Gadolinium (Gd) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3119a	Gallium (Ga) Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3120a	Germanium (Ge) Standard Solution	50 mL	HNO <sub>3</sub> 10% + HF 2%

SRM	Description	Unit of Issue	Nominal Acid Concentration of Matrix
3121	Gold (Au) Standard Solution	5 x 10 mL	HCl 10%
3122	Hafnium (Hf) Standard Solution	50 mL	HNO <sub>3</sub> 10% + HF 2%
3123a	Holmium (Ho) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3124a	Indium (In) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3126a	Iron (Fe) Standard Solution	50 mL	HNO <sub>3</sub> 10%
3127a	Lanthanum (La) Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3128	Lead (Pb) Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3129a	Lithium Standard Solution	5x10 mL	HNO <sub>3</sub> 1%
3130a	Lutetium (Lu) Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3131a	Magnesium (Mg) Standard Solution	50 mL	HNO <sub>3</sub> 10%
3132	Manganese (Mn) Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3133	Mercury Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3134	Molybdenum Standard Solution	5 x 10 mL	HCl 10%
3135a	Neodymium (Nd) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%

Certified values are normal font.

Reference values are italicized.

Values in parentheses are for information only.

## 104.5 - Spectrometry, Single Element Standard Solutions

These SRMs are intended as standard solutions for calibrating instruments used in atomic spectrometry, including atomic absorption spectrophotometry, inductively coupled plasma optical emission spectrometry, and inductively coupled plasma mass spectrometry. They can also be used in conjunction with any other analytical technique or procedure where standard solutions are required. Each SRM is a single element solution of 50 mL with a nominal concentration of 10 mg/g, except where indicated. Each unit is provided in either a single high density polyethylene bottle or in 5 x 10 mL borosilicate glass ampoules. NOTE: The certified values for SRM standard solution lots produced after March 1997 are stated in mass units, mg/g, rather than mg/mL. For the convenience of the user, each certificate provides instructions for preparing SRM dilutions by volume as well as by mass.

Commercial Producers of Elemental Standard Solutions: Instructions and a spreadsheet have been designed as an aid for establishing traceability of a batch of an elemental solution to the corresponding elemental spectrometric solution from the NIST SRM 3100 Series. Spreadsheet with ICP-OES example data is also included. When all required input fields are filled, the spreadsheet will calculate the traceable mass fraction and uncertainty of the batch elemental solution standard. The uncertainty provided by the spreadsheet assumes that the tested lot is stable. Any uncertainty due to changes over time to the lot tested, need to be quantified by the producer of the lot, and incorporated into the total uncertainty of the lot.

Instructions: [http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100\\_Version1-2-Instructions.pdf](http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100_Version1-2-Instructions.pdf)  
Spreadsheet: [http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100\\_TraceabilityToolsVersion1-2.xls](http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100_TraceabilityToolsVersion1-2.xls)  
Sample data: [http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100\\_ExamplesDataSetforTraceabilityToolsVersion1-2.xls](http://www.nist.gov/mml/analytical/inorganic/upload/SRM3100_ExamplesDataSetforTraceabilityToolsVersion1-2.xls)

PLEASE NOTE: The tables are presented to facilitate comparisons among a family of materials to help customers select the best SRM for their needs. For specific values and uncertainties, the certificate is the only official source.

3136	Nickel Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3137	Niobium Standard Solution	50 mL	HNO <sub>3</sub> 10% + HF 2%
3138	Palladium Standard Solution	5x10 mL	HCl 10%
3139a	Phosphorus (P) Standard Solution	5x10 mL	HNO <sub>3</sub> 0.8%
3140	Platinum Standard Solution	5x10 mL	HCl 10%
3141a	Potassium (K) Standard Solution	50 mL	HNO <sub>3</sub> 1%

SRM	Description	Unit of Issue	Nominal Acid Concentration of Matrix
3142a	Praseodymium (Pr) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3143	Rhenium Standard Solution	50 mL	HNO <sub>3</sub> 10%
3144	Rhodium Standard Solution	5x10 mL	HCl 10%
3145a	Rubidium (Rb) Standard Solution	5x10 mL	HNO <sub>3</sub> 1%
3147a	Samarium (Sm) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3148a	Scandium (Sc) Standard Solution	5x10 mL	HNO <sub>3</sub> 10%
3149	Selenium (Se) Standard Solution	5 X 10 mL	HNO <sub>3</sub> 10%
3150	Silicon Standard Solution	50 mL	H <sub>2</sub> O
3151	Silver Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3152a	Sodium (Na) Standard Solution	50 mL	HNO <sub>3</sub> 1%
3153a	Strontium (Sr) Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3154	Sulfur Standard Solution	5 x 10 mL	H <sub>2</sub> SO <sub>4</sub> 0.1%
3155	Tantalum Standard Solution	50 mL	HNO <sub>3</sub> 10% + HF 2%
3156	Tellurium Standard Solution	5 x 10 mL	HCl 10%
3157a	Terbium (Tb) Standard Solution	5x10 ml	HNO <sub>3</sub> 10%
3158	Thallium Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3159	Thorium Standard Solution	50 mL	HNO <sub>3</sub> 10%
3160a	Thulium (Tm) Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3161a	Tin (Sn) Standard Solution	50 mL	HNO <sub>3</sub> 5% + HF 1%
3162a	Titanium (Ti) Standard Solution	50 mL	HNO <sub>3</sub> 10% + HF 2%

SRM	Description	Unit of Issue	Nominal Acid Concentration of Matrix
3163	Tungsten Standard Solution	50 mL	HNO <sub>3</sub> 7% + HF 4%
3164	Uranium Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3165	Vanadium (V) Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3166a	Ytterbium (Yb) Standard Solution	5 x 10 mL	HNO <sub>3</sub> 10%
3167a	Yttrium (Y) Standard Solution	50 mL	HNO <sub>3</sub> 10%
3168a	Zinc (Zn) Standard Solution	50 mL	HNO <sub>3</sub> 10%
3169	Zirconium Standard Solution	50 mL	HNO <sub>3</sub> 10% + HF 2%
3177	Mercury (II) Chloride Standard Solution (1mg/g)	5 x 10 mL	HNO <sub>3</sub> 3% + HCl 4 %

Certified values are normal font.

Reference values are italicized.

Values in parentheses are for information only.

#### 104.5 - Spectrometry, Single Element Standard Solutions

These SRMs are intended as standard solutions for calibrating instruments used in atomic spectrometry, including atomic absorption spectrophotometry, inductively coupled plasma optical emission spectrometry, and inductively coupled plasma mass spectrometry. They can also be used in conjunction with any other analytical technique or procedure where standard solutions are required. Each SRM is a single element solution of 50 mL **with a nominal concentration of 10 mg/g, except where indicated**. Each unit is provided in either a single high density polyethylene bottle or in 5 x 10 mL borosilicate glass ampoules. NOTE: The certified values for SRM standard solution lots produced after March 1997 are stated in mass units, mg/g, rather than mg/mL. For the convenience of the user, each certificate provides instructions for preparing SRM dilutions by volume as well as by mass.

Commercial Producers of Elemental Standard Solutions: Instructions and a spreadsheet have been designed as an aid for establishing traceability of a batch of an elemental solution to the corresponding elemental spectrometric solution from the NIST SRM 3100 Series. Spreadsheet with ICP-OES example data is also included. When all required input fields are filled, the spreadsheet will calculate the traceable mass fraction and uncertainty of the batch elemental solution standard. The uncertainty provided by the spreadsheet assumes that the tested lot is stable. Any uncertainty due to changes over time to the lot tested, need to be quantified by the producer of the lot, and incorporated into the total uncertainty of the lot.

Instructions: [http://www.nist.gov/mml/analytical/inorganic/upload/SRM-3100\\_Version-1-2-Instructions.pdf](http://www.nist.gov/mml/analytical/inorganic/upload/SRM-3100_Version-1-2-Instructions.pdf)

Spreadsheet: [http://www.nist.gov/mml/analytical/inorganic/upload/SRM-3100\\_TraceabilityToolsVersion-1-2.xls](http://www.nist.gov/mml/analytical/inorganic/upload/SRM-3100_TraceabilityToolsVersion-1-2.xls)

Sample data: [http://www.nist.gov/mml/analytical/inorganic/upload/SRM-3100\\_ExampleData-Set-for-Traceability-ToolsVersion-1-2.xls](http://www.nist.gov/mml/analytical/inorganic/upload/SRM-3100_ExampleData-Set-for-Traceability-ToolsVersion-1-2.xls)

PLEASE NOTE: The tables are presented to facilitate comparisons among a family of materials to help customers select the best SRM for their needs. For specific values and uncertainties, the certificate is the only official source.

Certified values are normal font.

Reference values are italicized.

Values in parentheses are for information only.